

ECONOMICS OF PRODUCTION AND MARKETING OF TURMERIC IN WARANGAL DISTRICT OF TELANGANA STATE

काशी हिन्दू
विश्वविद्यालय



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THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF

Master of Science (Agriculture)
IN
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Supervisor

Prof. Chandra Sen

Submitted by

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Dedicated to



*My Beloved Parents
...who sacrificed their today
for my tomorrow.*

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To,
The Registrar (Academic)
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Through: *The Head, Department of Agricultural Economics, Institute of Agricultural Sciences, B.H.U, Varanasi.*

Dear Sir,

*I have great pleasure in forwarding the thesis entitled “**Economics of Production and Marketing of Turmeric in Warangal District of Telangana State**” submitted by **Mr. Dharavath Jagadeesh**, I.D. No. E-15028, in partial fulfillment of the requirements for the degree of **Master of Science (Agriculture)** in **Agricultural Economics**, from Department of Agricultural Economics, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi.*

*I certify that the entire scheme of investigation reported herein, was planned and carried out by **Dharavath Jagadeesh** under my guidance to the best of my knowledge and belief; the data presented in the thesis are genuine and original. No part of the work has been submitted for any degree or distinction.*

Thanking you,

Forwarded by

Yours faithfully,

Head

Prof. Chandra Sen
(Supervisor)

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By

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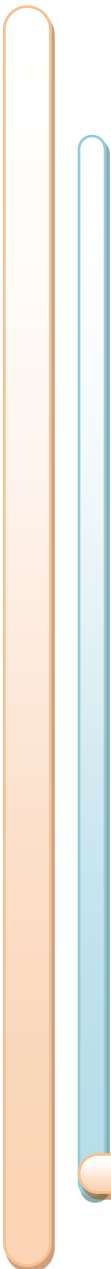
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Date:

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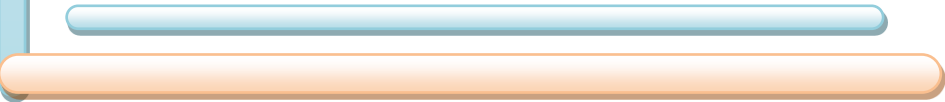
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Contents



<i>1. Introduction</i>	<i>1-6</i>
<i>2. Review of Literature</i>	<i>7-26</i>
<i>3. Materials and Methods</i>	<i>27-34</i>
<i>4. Results and Discussion</i>	<i>35-55</i>
<i>5. Summary and Conclusion</i>	<i>56-61</i>
<i>♦ Bibliography</i>	<i>i-vii</i>



LIST OF ABBREVIATIONS

%.	:	Percentage
e.g	:	For example
et al	:	and others
Fig	:	Figure
GDP	:	Gross Domestic Product
ha	:	Hectare
i.e	:	that is
Rs	:	Rupees
Viz	:	Namely
Vs	:	Versus

LIST OF TABLES

Table No.	Table Name	Page No.
4.1.	Family size of sample farm households	35
4.2	Distribution of households based on annual income	36
4.3.	Educational status of heads of sample farm households	37
4.4.	Age of heads of sample farm households	38
4.5	Experience in turmeric cultivation	39
4.6	Land holding pattern of sample farm households	39
4.7	Livestock holding of the sample farmers	40
4.8	Quantity of inputs used in turmeric cultivation	41
4.9	Cost of cultivation of turmeric for sample farmers	42-43
4.10	Results of Cobb-Douglas production function for turmeric Dependent variable: Turmeric yield	44
4.11	MVP/MIC Ratio for inputs used	45
4.12	Price Spread of turmeric in Market channel I	47
4.13	Price Spread of turmeric in Market channel II	48
4.14	Price Spread of turmeric in Market channel III	49
4.15	Table. Price Spread of turmeric in Market channel IV	50
4.16	Marketing Efficiency of turmeric through Shepherd method	52
4.17	Marketing Efficiency of turmeric through Acharya's approach	52
4.18	Marketing Efficiency of turmeric by using Calkin's index	53
4.19	Problems faced in turmeric cultivation by sample farmers	54
4.20	Problems faced in marketing of turmeric by sample farmers	54
4.21	Problems Faced by Intermediaries	55

INTRODUCTION

The agriculture and allied sector continues to be pivotal to the sustainable growth and development of the Indian economy. It also contributes a significant figure to the Gross Domestic Product (GDP). Sustainable agriculture, in terms of food security, rural employment, and environmentally sustainable technologies such as soil conservation, sustainable natural resource management and biodiversity protection, are essential for holistic rural development. Indian agriculture and allied activities have witnessed a green revolution, a white revolution, a yellow revolution and a blue revolution. The total Share of Agriculture & Allied Sectors (Including Agriculture, Livestock, forestry and fishery sub sectors) in terms of percentage of Gross Domestic Product is 13.9 percent during 2013-14 and employed 54.6% of the total workforce (Indian Economic Survey 2014-15). Agricultural production and productivity have shown significant growth over the last more than three decades. However, problems are numerous in different marketing systems especially marketing infrastructure, information system and policies. Over the years, the central and state governments have taken number of efforts to improve both input and output production and marketing systems of Indian agriculture through the subsidized supply of inputs for agriculture, transfer of improved technologies to farmers, induce productivity gains through subsidies, strengthen marketing infrastructure, etc. Lack of market information, inadequate marketing infrastructure, and lack off and/or inadequate access to storage, transport and processing facilities, however, continue to be persistent problems to the Indian farmers. Hence, study of issues pertaining to marketing of various agricultural commodities occupies centre stage in economic research.

Cultivation of turmeric

Turmeric cultivation is confined to South East Asian countries such as Indian, Sri Lanka, China and Indonesia. The main turmeric growing states in India are

Telangana, Andhra Pradesh, Maharashtra Orissa, Tamil Nadu, Karnataka and Kerala. Turmeric requires a hot and moist climate. Best suited soils for cultivation are loamy or alluvial, loose, friable and fertile soils. It grows at all places ranging from sea level to an altitude of 1500m above MSL. It is very sensitive to low atmospheric temperature. It is grown both under rainfed and irrigated conditions. Like other tuber crops, turmeric also requires deep tilth and heavy manuring for high yields. Beds of convenient length and width are prepared based on the topography of the land. Planting is done either on raised beds or on ridges during May-June.

Turmeric is propagated vegetatively through rhizomes. Healthy and disease-free rhizomes with one or two sprouting buds are used. The crop becomes ready for harvest in about 8-9 months after planting. The main harvest season begins from February and extends up to April. Turmeric is harvested when leaves turn yellow and start drying up. In harvesting, the whole clump is lifted out with the dry plant, then the leafy tops are cut off, the roots are removed, all the adhering mud particles are shaken or rubbed off and the rhizomes are then washed well with water. The fingers, sometimes called the daughter rhizomes, are separated from the mother rhizomes and kept in shade for 2-3 days.

Aroma and flavor

Raw turmeric rhizomes have to be cured for both colour and aroma. For this, the fingers and bulbs are boiled separately in water for 30-45 minutes until the rhizomes are soft. Water is then drained and the turmeric sun dried for 10-15 days until they become dry and hard. For imparting orange yellow colour, the rhizomes are boiled in lime water or sodium bicarbonate solution. The dried produce is cleaned and polished mechanically in a drum rotated by hand or by power.

Turmeric oleoresin is obtained by solvent extraction of the ground spice. It is orange-red in colour and consists of colouring matter, volatile oil, fatty oils and bitter principles. The volatile oil gives the turmeric its characteristic flavor. The important quality attributes of turmeric are size, physical form, colour, curcumin content, maturity, weight or bulk density, length and thickness, intensity of colour of the core and aroma.

Turmeric contains two primary constituents, the colouring matter and the volatile oil. The volatile oil of turmeric is about 1.5- 6.0% and is composed of a variety of sesquiterpenes, many of which are specific for the species. Conjugated diarylheptanoids (1,7- diary 1-hepta- 1,6-diene-3,5-diones, e.g. curcumin) are responsible for the orange colour and probably also for the pungent taste (3 to 4%). The crystalline colouring matter, curcumin, is diferuloyl methane. It dissolves in concentrated sulphuric acid giving a yellow-red colouration.

The rhizomes contain curcuminoids , demethoxy curcumin, bis-demethoxy curcumin, 5- methoxy curcumin which are found to be natural anti-oxidants. A new curcuminoid , cyclocurcumin , was isolated from the nematocidally active fraction of turmeric. The fresh rhizomes also contain two natural phenolics which possess antioxidant and anti-inflammatory activities and also two new pigments. The rhizomes are also reported to contain four new polysaccharides having activity on the reticuloendothelial system, along with stigmasterol, sitosterol, cholesterol and 2-hydroxymethyl anthraquinone. (spice Board, Kerala, 2013)

Culinary use

Turmeric is a very unique and versatile natural plant product combining the properties of

- ❖ spice or flavour
- ❖ colourant of brilliant yellow dye
- ❖ cosmetic and
- ❖ drug.

It is mainly a spice that the colouring properties are usually more important than its flavour attributes. Turmeric is a major ingredient in curries and curry powders, contributing flavour as well as the characteristic yellow colour. Turmeric is used for dyeing wool and cotton fabrics. It is also employed as a colouring material in pharmacy, confectionary, food industries and also in paints and varnishes.

In India there are approximately 30 varieties are recognized in the type of curcuma in which turmeric belongs. Some popular varieties among them are 'Alleppey Finger' (Kerala), 'Erode and Salem turmeric' (Tamil Nadu), 'Rajapore' and

'Sangli turmeric' (Maharashtra), 'Nizamabad Bulb' (Telangana), 'Duggirala' (Andhra Pradesh). The important exported varieties are Allepey Finger turmeric, Rajapore, and Erode.

Based on the duration of crop in the field to mature the varieties are categorised into three groups:

- ❖ Long duration types (9 months) - Tekurpet, Duggirala, Armur and Mydukuru
- ❖ Medium Duration types (8 months) - Kothapet, Krishna and Kesar
- ❖ Short duration types (7 months) – Amalapuram and Dindigram

Medicinal use

Traditionally turmeric is being used in Indian system of medicine. It has several medicinal properties like stomachic, carminative, tonic, blood purifier, vermicide and antiseptic. The active constituent of turmeric, curcumin, has been shown to have a wide range of therapeutic effects. Because it is a strong antioxidant, it protects against free radical damage. Curcumin has also been shown to have a marked anti-inflammatory effect. It accomplishes this by reducing histamine levels and possibly by increasing production of natural cortisone by the adrenal glands. Curcumin also protects the liver from a number of toxic compounds.

Global scenario

Turmeric (*Curcuma longa*) is native of Asia and India. The tuberous rhizomes or underground stems of turmeric are used from antiquity as condiments, a dye and as an aromatic stimulant in several medicines. Turmeric is a very important spice in India, which produces nearly the whole world's crop and uses 80% of it. Presently, it is cultivated in China, Taiwan, Indonesia, Sri Lanka, Australia, Africa, Peru and the West Indies.

Indian scenario

The important turmeric growing states in India are, Telangana, Andhra Pradesh, Tamil Nadu, Orissa, Maharashtra, Assam, Karnataka, Kerala and West Bengal. In which telangana occupies 30 per cent of total turmeric area followed by

Andhra Pradesh and Tamil Nadu occupying 27 per cent and 19 per cent of total area respectively. In terms of production Telangana accounts 42 per cent followed by Andhra Pradesh (36 per cent) and Tamil Nadu (21 per cent) during 2014-15.(National Horticultural Board)

Study area status

Warangal is one of the major turmeric growing district in Telangana. It ranks second in area and production in the state after Nizamabad district. The area under turmeric in Warangal district is 14728 hectares and production is 87110 metric tonnes during 2014 – 20115 (Department of Horticulture, Government of Telangana). With the problems of bulkiness and perishability, the market for turmeric as for most other farm products suffers from several problems. Only an efficient market that helps quick transport, scientific storage and processing can help farmers receive better services and prices. Hence, marketing of turmeric is as important as its production to ensure reasonable profit to the farmers. Though there is well-organized market for turmeric in Warangal district, its impact on value received by farmers for their turmeric demands a detail study. Establishment of regulated markets in Warangal district has not helped the farmers much, because majority of them depend on commission agent for their credit needs and farmers in the bond of selling turmeric to those middleman. The lack of suitable storage facility, processing facility and uncertainty of prices discourage many farmers from undertaking large scale cultivation of turmeric. Next big problem is price fluctuation in turmeric markets. It is found that the farmers could not get good prices because lack of price information. So the need of the hour is efficient price forecasting mechanism which will forecast prices effectively. Hence, the present study aims to analyze the production and marketing problems faced by the farmers on resource use efficiency, efficiency of the market channels through which turmeric is marketed.

Objectives

1. To study the economics of production of turmeric in Warangal district,
2. To identify and evaluate marketing channels for turmeric in the study area,
3. To identify constraints in production and marketing of turmeric in the study area.

Scope of the study

A study on the marketing of turmeric would be useful to the producers to make appropriate and specific marketing decision to get better income from their produce. The study on market mechanism and market power analysis explains the extent of exploitation by the middleman and help formulation of suggestions for meaningful policy interventions by the government to protect the interest of growers. Also, attempt has been made to reduce the marketing cost for the farmer when he sells through different marketing agencies.

Limitations

The study is based on primary data collected from a sample of producers, pre-harvest contractors, local traders, commission agents, wholesaler, retailer, exporters and processing firms. As many producers and consumers have not maintained proper records, they furnish the required information from their memory and experience; therefore, the collected data are subjected to recall bias. However maximum efforts have been taken to minimize bias by proper crosschecks. Further, the data collected for the study pertain to one year and a specific geographical locality viz., Warangal district only. Hence, adequate care should be taken while generalizing the results.

Structure of thesis

The study is presented in five chapters as follows:

Chapter I: Introduction – Describes the importance of the topic, objectives, scope and limitations of the study.

Chapter II: Review of literature – A brief review and definition of concepts, economic models and results of the related studies are presented.

Chapter III: Methodology – The methods materials encompassing sampling, data Collection, analytical tools, and methods of evaluation explained.

Chapter IV: Results and Discussion – A detailed discussion of the results of the study is made to draw specific inferences.

Chapter V: Summary and conclusion – A brief summary of work done, the salient findings, and their implications for policy are presented.



REVIEW OF LITERATURE

A comprehensive and up-to-date review of literature is necessary for in any field of scientific enquiry so as to understand the various concepts to be used in the proposed study and more importantly to gain a clear knowledge about the gap in the past studies so that the proposed study would make a serious effort to address those gaps in the existing literature. For a better and clear understanding of concepts, one need to be aware of what they actually refer to and how various economists have preferred to look at it. Moreover review of related concepts and past studies will give us a holistic picture and that will in turn help in analyzing and understanding the problems in proper perspective. This chapter briefly reviews the concept, analytical tools and findings of the past studies which are relevant for present study.

Review of past studies

1. production function analysis
2. Marketing cost and price spread
3. Marketing efficiency
4. Constraints in production and marketing

1. Production function analysis

Sharma *et al.* (1990) used Cobb-Douglas production function to work out the elasticities of production of factor inputs. The results showed that the elasticity of inputs particularly labour did not vary significantly between marginal, small and large farms and hence concluded that farm size was not an important factor to influence the productivity of inputs.

Handiganur (1995) in their study “Economics of production and processing of grapes in Bijapur district, Karnataka” analyzed the growth rates of area, production and productivity of grapes in Bijapur district from 1978-79 to 1992-93. Growth rate

analysis had showed an increase of 7.12 per cent of area in Bijapur district and an increase of 0.6 per cent in area, 2.80 per cent in production and 2.0 per cent in productivity of grapes was observed in Karnataka state. The increase in production and productivity was due to the use of improved cultural practices, increased use of manures, fertilizers and plant protection chemicals.

Hiremath *et al.* (1995) used Cobb-Douglas production function to analyze the resource use efficiency in ber production. In ber production the marginal value product to marginal factor cost ratio for land was more than unity in both small and large size groups indicating the scope for increasing profit by increasing the area under ber cultivation.

Gaddi *et al.* (1996) employed Cobb-Douglas production function and estimated the marginal value productivity of land, bullock labour and FYM in the production of sunflower. This study indicated that MVP of their resources were greater than their marginal factor costs in all the categories of farms indicating the scope for the use of more of these resources to increase the production. Fertilizer was used in excess on small farms whereas seeds were used in excess on large farms in the production of Sunflower.

Gowda and Chandrasekar (1996) used Cobb-Douglas production function for allocation of resources like land, FYM and seed in groundnut production. They found that withdrawal of certain resources would increase the profit and suggested that the farmers had to be educated to use scientific methods of production in order to achieve the potential output through proper extension activities.

Ramanna and Chinappa (1997) by using Cobb-Douglas production function evaluated the resource use efficiency in guava production. They found that to obtain optimum yield levels, the farmers must reduce the expenditure on fertilizer and plant protection chemicals and increase the use of labour.

Krishnamoorthy (1999) observed that increased use of labour, nitrogen and potash and decreased application of plant protection chemicals would increase the yield of grapes. Integrated pest and disease management gave the best solution to reduce the high cost of plant protection measures.

More (1999) in their study “Economics of production and marketing of banana in Maharashtra state” analyzed the growth rate in area, production and productivity of banana in Nanded district, Parbhani district and Maharashtra state as a whole (4.50%) due to suitability of climate to cultivate banana in addition to more awareness of farmers towards horticultural crops in Nanded district. In Nanded district production growth rate had shown higher growth rate (21.04%). The higher growth in production was contributed mainly by significant increase in area coupled with productivity. The growth rate of productivity was high (1.43%) in Maharashtra state as a whole as compared to Nanded (1.40%) and Parbhani (0.90%) district. It was due to the use of improved cultural practices, higher use of manures and fertilizers, more use of other inputs and also increased yield levels in other districts of the state.

Pajankar *et al.* (2005) used the Cobb-Douglas production function to work out the resource use efficiency and concluded that the regression coefficients of area, seed and bullock labour were significant while those of physical labour, manures and fertilizers and irrigation were non-significant.

Singh and Grover (2007) reported that cost on human labour and cost on plant protection measures were significant at 5 per cent level on large farms and 1 per cent level on small farms using Cobb- Douglas type of function in sesame cultivation.

Vijaya Kumar *et al.* (2008) used Cobb-Douglas production function to evaluate the resource use efficiency in rice cultivation. They found that to obtain optimum yield levels, the farmer must reduce the expenditure on fertilizer and labour and should increase the seed rate.

Handigol *et al.* (2008) used Cobb-Douglas production function to study the resource use efficiency in anthurium cultivation and concluded that plant protection chemicals were significant in organized sector and fertilizers were significant in unorganized sector at one per cent level.

Mishra (2009) studied horticulture as a livelihood activity for rural people and value chain analysis of tomato in Rajnandgaon district of Chhattisgarh. The study defined horticulture as a livelihood activity for rural people focusing with the value chain analysis of tomato. The value chain was the range of services required to bring a

product from conception to the final consumer. A theoretical basis of value chain analysis, as the value added at each step of the chain, was explained along with problem analysis of tomato production. Despite the difficulties of obtaining data, the study demonstrates some common trends space the tomato cultivation in rajnandgaon district.

Pawar *et al.* (2009) in their study of Bajra – rabi Jowar cropping sequences in Aurangabad district of Maharastra used Cobb- Douglas production function to determine the resource productivity and resource use efficiency. It was observed that regression coefficient of machine labour was 0.071 which was positive and significant at five percent level. Similarly area indicated positive regression coefficient as 0.268 which was also significant at five percent level. Bullock labour, seed, nitrogen and phosphorous were positive but non-significant. The sum of regression coefficient was 0.89, which indicated decreasing returns to scale. In regard to resource use efficiency, the use of machine labour indicated the highest MVP to price ratio (4.58), followed by seed (4.34), human labour (1.61) which were greater than unity. On the contrary MVP to price ratios with respect to area, bullock labour, nitrogen and phosphorous were less than unity.

Takle *et al.* (2009) studied resource use efficiency and returns to scale in the cultivation of cotton, banana, and soybean crops in the command area of Upper Penganga irrigation project in Maharastra. Cobb- Douglas production function in double log form was used to estimate resource use efficiency and returns to scale. Output per hectare in value terms was the dependent variables and land in hectares, and per ha in value of human labour, bullock labour, manures and fertilizers, pesticides, working capital, seeds and irrigation were independent variables. The study indicated excessive use of manures and fertilizer in banana cultivation. It also indicated the operation of increasing return to scale in cultivating this crop. It is found that almost all resources were efficiently used in soybean cultivation. Excessive but ignorable use of manures and fertilizers and pesticides was observed in cotton cultivation.

Barakade *et al.* (2011) estimated the Economics of onion cultivation and its marketing pattern in Satara district of Maharashtra. A sample of 180 onion

growers was selected randomly from 20 villages in ten tahsils of Satara district of Maharashtra. Onion cultivation is concentrated in the eastern part of the Satara district. The selected cultivators were classified into three categories i.e. small (below 2 ha.), medium (2-4 ha.) and large (above 4 ha.) based on land holding size of the farmers. The primary data were collected by survey method with the help of pre-tested schedule of questionnaire through personal interview.

Nandeshwar *et al.* (2013) studied economics of vegetable production and price spread in marketing of vegetables. The study was based on Primary data for the year 2008-09 collected from different villages of different tahsils in Akola district of Maharashtra. The authors observed Vegetable cultivation was labour intensive were as capsicum crop required high capital investment and is high profit giving enterprises in net shade conditions. Input output ratio was more in onion than others crops but net returns was maximum in case of capsicum. Capsicum cultivation under net shade condition was estimated more gross income. High cost of inputs, losses due to climatic changes, uncertainty of prices, disease and pest attack etc. were major constraints faced by vegetable growers during production and marketing of vegetables.

Nalini Rajan Kumar *et al.* (2014) used Cobb- Douglas type of production function to analyse the input-output relationship per hectare in tea plantations, taking yield as dependent variable and independent variables were planting materials, manures, fertilizer, human labour and area under tea. He found that the marginal value product of the different inputs was varied with location and size.

Gunasekaran (2015) analyzed the factors influencing production and marketing of banana in karur district. Banana are the fifth largest agricultural commodity in world trade after cereals, sugar, coffee and Cocoa. Banana crop is widely grown in India and has great socio-economic and religious significance. It contributes 34.2 percent of the National income. It requires adequate water with good soil also affected with environmental factors. The objective of the study is to analyze factors influencing production and marketing of banana in Karur district. The study is a combination of both descriptive and analytical methods. The present study is empirical and hence field survey method and personal interview technique were

adopted. The study indicated that the all factors favour to cultivation of banana production.

Ankeeta Mukherjee *et al.* (2015) analysed the production and marketing of hybrid maize in sarguja district of Chhattisgarh. A study was conducted to estimate cost and return, price spread, marketing efficiency, constraints in production and marketing of hybrid maize in Sarguja district of Chhattisgarh. A sample of eighty farmers was surveyed (fourty five marginal, twenty five small and ten large) by three stage stratified random sampling method. Three predominant marketing channels were producer→consumer, producer→villagetrader→consumer, producer→villagetrader→ wholesaler→retailer→consumer. Regression analysis for different categories of farm holdings was carried out by using Cobb-Douglas type of production function considering variables like labour, seed, manure and fertilizer cost.

Sapurti *et al.* (2015) present investigation pertaining to impact of horticulture and livestock based technologies on productivity, production and marketed surplus of agricultural produce was conducted in Udaipur District of Rajasthan during the year 2013-14. The study covered 45 beneficiaries and 45 non-beneficiaries from six selected villages. The results of the study revealed that the overall average productivity of all major field crops was significantly higher on the beneficiary households as compared to non-beneficiary households. The average production of field crops and milk per household/annum was 49.46 quintals and 868.23 liters, respectively, on beneficiary households while corresponding figures for non-beneficiary households were 29.03 quintals and 734.10 liters.

2. Marketing cost and price spread

Srivastava (1984) in his study on price spread for vegetables showed that the retailers' share increased when the consumer's price increased, whereas the producer share decreased with an increase in the consumer's price. He concluded that the benefit derived from an increase in the consumer price did not go to the producers. Instead it was absorbed by the retailer.

Nadwadkar (1991) in his analysis on marketing efficiency and price spread of vegetables in Western Maharastra reported that the marketing cost incurred included

grading charges, packing charges, packing materials, transport, weighing, commission and miscellaneous expenses. They regarded higher proportion of intermediaries' profits as the indicators of inefficiency of the marketing system.

Kiresur *et al.* (1993) study of the costs and returns of vegetable growing was carried out in Dharwad and Hubli taluks in Dharwad district, Andhra Pradesh, India. The sample included 81 tomato growers, 69 aubergine cultivators, 55 onion producers and 83 potato farmers. Data were collected for 1985/86. The costs of production were highest for potatoes followed by onions, tomatoes and aubergines. The highest net returns were obtained from aubergines (Rs 58/quintal) in Dharwad taluk, followed by onions (Rs 51/q) in Hubli taluk. Net profit was lowest for potatoes.

Krishna (1994) reported that area under vegetable production in Bihar state has remained almost stagnant. Four vegetable crops are studied (potatoes, sweet potatoes, onions and chillies). The marketable surplus of these crops varies between 78% and 91%. Village sales are high for small farmers but low for large farmers. Cooperative marketing institutions play an important role in Ranchi market but are non-existent in Jamshedpur. Marketing margins are high in both markets, reducing the producers' share of the consumer price.

Barman and Baurah (2001) in their study on marketing margin, price spread and marketing efficiency of cauliflower in Barpeta district of Assam, identified two marketing channels for cauliflower. Channel I comprised of producer, primary wholesaler, secondary wholesaler, retailer and consumer. Channel II comprised of producer, retailer and consumer. They found that the farmers marketing cost accounted for 75.56 per cent of the total marketing cost for an average farm size. The marketing cost borne by the primary wholesalers and secondary wholesalers were 6.95 per cent and 5.58 per cent of consumer's price respectively in channel I. Price spread as per cent of consumer's rupee was found to be 60.38 per cent in channel I. Marketing efficiency was higher in channel II. The farmers were found to sell their produce to intermediaries under financial obligations and were unable to store their produce owing to lack of proper storage facilities.

Kamble *et al.* (2002) the cost and return structure of onion production in Bellary and Dharwad districts, Karnataka, India was evaluated based on data from

120 sample farms (38 small, 38 medium, and 44 large farms). Mean per hectare total cost of cultivation in Dharwad district was Rs. 7338.55, 8723.78, and 7916.97 on small, medium and large farms, respectively. In Bellary district, mean per hectare total cost of cultivation was Rs. 9739.39, 11 190.37 and 11 874.39 on small, medium and large farms, respectively. Mean per hectare net returns in Dharwad district were Rs. 6602.45, 11 426.97 and 7484.28 on small, medium and large farms, respectively. In Bellary district, mean per hectare net returns were Rs. 6350.13, 4553.60, and 6558.78 on small, medium and large farms, respectively.

Pramanic *et al.* (2003) a study was undertaken to find out the economics of production and marketing of vegetables in Andaman and Nicobar Island. Results indicated that the yield of ginger, cucumber, bitter 15 gourd, chilli and ridge gourd were higher in that order. Correspondingly, the total cost of cultivation was observed to be higher for ginger, bitter gourd, chilli, brinjal, ladyfinger etc. It was also found that the yield of all the vegetables were higher in hilly land then in valley land. Cost – benefit ratio was the higher for chilli followed by cucumber, ladyfinger, marsa, cowpea, snake gourd etc. and it was found to be higher in hilly land then in valley land for all the vegetables. The margin to both the wholesaler and the retailer was highest in ginger (Rs.14.10 and Rs.32.50 per Kg, respectively). Conversely, the marketing margin was the lowest in basal and marsa (Rs.0.90) for wholesale and in potato (Rs.1.50) for retailer.

Balappa and Hugas (2003) the study analyses the costs and returns of onion production as well as the channels, costs, and margins of onion marketing in north Karnataka, India. The analysis is based on data for the year 1999-2000 collected from a sample of 150 growers, 30 wholesalers, 30 commission agents, and 30 retailers. It is revealed that although farmers are producing adequate quantities of onions to meet consumer demand, they are facing problems in marketing their produce. On the other hand, market intermediaries are accruing higher margins by incurring less costs.

Vinod Wanjari *et al.* (2004) in their study on price spread of pomegranate in Maharastra state found that 90 per cent of the produce was marketed through three major marketing channels. Channel I involved producer, commission agent, wholesaler, retailer and consumer. Channel II involved producer, co-operative

society, commission agent, retailer and consumer. Channel III involved producer, commission agent (local), trader (distant), wholesaler, retailer and consumer. Local channels like 1) producer and consumer 2) producer, retailer and consumer 3) producer, pre-harvest contractor, retailer and consumer existed through which 10 per cent of the produce was marketed. Producers with small holdings preferred co-operative society and marketing of produce through forming self-help groups for transportation. Packaging, long distance transportation and commission charges accounted for 90 per cent of the marketing costs. Marketing efficiency was the maximum in marketing through co-operative society closely followed by private commission agents. Retailer's margin was 38.50 to 56.33 per cent in the price paid by the consumer and it was the single most important factor that determined market efficiency.

Durgawati *et al.* (2005) conducted a study on economic analysis of onion and potato in the Malwa Region of Madhya Pradesh and revealed that in small size group the obtained gross income from onion Rs.55290 (maximum) followed by Rs. 51870 in medium size and Rs. 50472 minimums in large size. The average productivity and gross return of the study area onion was recorded 87.57q./ha and Rs.52554, respectively. In potato crop the gross income was Rs.56,100 (maximum) in small size group followed by 54200 in medium size of and Rs. 53880 minimum in large size. The average productivity and gross return of the study area from potato was recorded 120.4q./ha and Rs. 55319, respectively

Sharma and Deepak Anchal (2009) studied price spread of Litchi in Punjab. They concluded that marketing channel. i.e., Producer – Preharvest contractor – Retailer – Consumer was the most efficient one from producer as well as consumer point of view as the producer could get 72.08 per cent while remaining 27.92 per cent of consumer rupee was either incurred on different marketing cost by the producer / pre harvest contractor / retailer. The margin of middlemen in between producer and consumer was found to be Rs. 255.80 in local market, Rs. 524.80 in Amristar market and Rs. 910.49 in Delhi market. Thus the price spread is minimum for local market and maximum in the case of Delhi market.

Singh and Anupam (2010) studied economics of production and marketing of tomato in Kanke block of Ranchi district. They identified three marketing channels of tomato. Channel 1 is Producer – Consumer. Channel 2 is Producer – Wholesaler – Consumer. Channel 3 was Producer – Wholesaler - Retailer – Consumer. It was observed that all the marginal farmers sold their produce through channel 1, while 40 per cent small farmer sold through channel 3, 25 per cent and 35 percent from channel 1. Among marketing costs, packaging and marketing cost were most important. Producer's share in consumer's rupee was indirectly related to the number of intermediaries in the channel of marketing. As the number of functionaries increases, the share of producer in the consumer's rupee gets reduced.

Upadhyay *et al.* (2011) studied production and marketing of mushroom in Udaipur district of Rajasthan. They found that producer's share in consumer's rupee decreased with an increase in the length of marketing channel.

Palanivel *et al.* (2015) the author analyzed a study on cultivation and marketing of mangoes in Krishnagiri district, Tamil Nadu. The observed Marketing of mangoes differs from place to place among the Indian Farmers, in Krishnagiri district former cultivation mango are sell their mangoes into local trader, commission agents, direct selling to juice factories and oral contract between seller and buyer. The price fixing method of the mangoes based on the situation of the market and demand of the mango in Krishnagiri district and majority of the mango consumed by mango industry into mango pulps.

Uma Gowri and Shanmugam (2015) observed an economic analysis of production and marketing of banana in India. The authors analyzed the trends in banana area, production in India. They examined the banana cultivation practices and its economics and price spread in banana marketing.

3. Marketing Efficiency

Arshad (1983) evaluated the efficiency of coconut marketing system in Malaysia and observed that the efficiency suffered from various inefficiencies in the form of imperfection that existed in market structure, practices and performances. Farm level constraints and lack of marketing facilities had resulted in low quality

product, which in turn induced the middlemen to indulge in unethical trading practices.

Srivastava (1984) in his study on dynamics of vegetables marketing showed that the retailers' share increased with an increase in consumer's price, whereas the producer share decreased with an increase in the consumer's price. He concluded that the benefit derived from an increase in the consumer price did not go to the producers; instead it was absorbed by the retailer.

Dasarthan *et al.* (1991) in her study on marketing of cereals in Telangana state revealed that nearly 62 per cent of respondents sold their output immediately after harvest, due to lack of storage facilities to meet present consumption. She found that the major problems in marketing of agricultural produce were lack of infrastructure facilities in market yard, poor grading and standardization of products, unhelpful attitudes of commission agents and purchasers, marketing authorities' maladjustments. Due to illiteracy among farmers, they were unable to maintain and follow crop accounts and marketing regulations.

Jaya Anand (1991) in her study on marketing of cereals in Andhra Pradesh indicated that the co-operative marketing societies should take advantages of the price fluctuations in order to give better price to the producers and stressed the need for revising the selling policy of co-operatives so as to earn more profits and pay the producers remunerative prices.

Autkar *et al.* (1996) in their study on dynamics of marketing of selected fruits in Nagpur, used Shepherd formula in working out the marketing efficiency. They identified two marketing channels, one in which producer, pre-harvest contractor, commission agent and 9 retailer were involved, and in the other, producer, commission agent and retailer were involved. They also found that producer's share in consumer's rupee was only 39.34 per cent in the case of apples, whereas the retailer got 41.06 per cent of the share. The study also revealed that marketing efficiency was higher for seedless grapes compared to apple and mango in Nagpur.

Marothia *et al.* (1996) indicated that the percentage area under vegetables decreased as the size of holdings increased. They identified two marketing channels of

Tomato and Brinjal. Channel I comprised of producer, seller, commission agent, retailer and consumer. Channel II comprised of producer, seller and consumer. Small farmers preferred to sell their vegetables directly to consumers, while the medium and large farmers sold their produce to retailers through commission agents. The percentage of vegetables sold by medium farmers varied from about 26 to 32 per cent and it was 68-73 per cent in case of large farmer.

Jagdish (2001) in his study on vegetables production and marketing in Bihar found that more than 80 per cent of the farmers sold their produce through the market intermediaries namely commission agents and village merchants. He identified three marketing channels viz.; (i) Channel I which involved farmer, village merchant, wholesaler/commission agent, retailer and consumer, (ii) Channel II which involved farmer, commission agent, retailer and consumer and Channel III which involved farmer, wholesaler, commission agent, retailer and consumer. The producer's share in consumer's rupee for potato in channels I and II were 57.64 per cent and in channel III it was 60.79 per cent. Thus the share of producers share and the marketing cost and margins were high in all the marketing channels indicating there by large price spread which was a cause for marketing inefficiency.

Sindle *et al.* (2001) in their study on marketing of banana in Parbhani market of Maharashtra state found two marketing channels; Channel I comprised of primary wholesaler, commission agent/wholesaler, processor, retailer and consumer. Channel II comprised of wholesaler, processor, retailer and consumer. The wholesaler's share in consumer's rupee was 48.25 and 37.56 per cent in channel I and channels II, respectively. Retailers share in the consumer's rupee was 20.18 per cent and 20.69 per cent and the total marketing cost were Rs. 112.25 and Rs. 95.20 per bunch in channel I and channel II respectively. The maximum and minimum arrivals of banana were during November and May respectively.

Kazi Rahim and Debashi (2001) in their study on trade channels and price movements of fruits and vegetables in West Bengal traced three marketing channels. Channel I consisted of farmer, commission agent and wholesaler. Channel II involved farmer, pre-harvest contractor, commission agent, wholesaler, retailer and consumer. Channel III involved farmer, commission agent and processing unit. In case of potato

uneven pattern of arrivals was seen and in case of cabbage maximum and minimum arrivals have been noted in the months of December to February respectively. This indicated that the market arrivals of major vegetables have developed an un-even trend over the years which were mainly due to considerable fluctuations in the supply of the commodities in West Bengal. The prices of potato remained during February and December. The differences between maximum and minimum prices were much higher in vegetables than that of fruits. The inter-month fluctuations were very high and common in almost all the major vegetables.

Baurah and Barman (2001) in their study on marketing of cauliflower in Barpeta district, Assam identified that lack of storage facilities was the main problem faced by farmers.

Sachin Kumar Jain *et al.* (2001) in their study on production and marketing of potato in Indore district of Madhya Pradesh State, used correlation coefficient to study the relation between arrivals and prices of potato in the study area. They found that the prices were lower in the months of March, June, November and December. Prices were medium in the months of April, May, July due to average arrivals. The producers share in consumer's rupee at Indore vegetable mandy in the marketing of potato was found to be 65.08 per cent. The producer's relatively low share was primarily due to higher marketing and transportation charges on one hand and higher margin of the middlemen on the other.

Mohapatra (2001) in his study on production and marketing of onion in Bolangir district, Orissa identified that the producer received the maximum share (98 per cent) of consumer's rupee, when sold through the wholesaler.

Singh and Ajay (2002) in their study on market analysis of fruits and vegetables in Patna, identified that farmers have incurred Rs.10-15 per basket of 60 kg of cabbage and cauliflower and the unloading charges was Rs.2-3 per 100 heads in case of cabbage and cauliflower respectively. Loading and weighing charges was Rs.3/100 heads in case of cabbage. Bicycle was used by small and marginal farmers for transportation and tractors and rickshaw were used by large and medium farmers for transportation. Expenditure incurred by farmers on labour for harvesting operations was more in comparison to packing as well as sorting.

University of Madras (2003) in its study on marketing of fruits and vegetables in and around Chennai identified a major marketing channel in Koyambedu wholesale vegetable market, i.e producer, wholesaler- cum-commission agents, retailer and consumers. Among the market functionaries the retailer incurred higher costs in case of brinjal and lady finger while wholesaler-cum-commission agents had incurred the higher cost in rest of the vegetables. The agent commission formed an important cost item of marketing paid by the producer in case of vegetables like potato, onion and tomato. In case of other vegetables transport and handling charges formed an important item of cost paid by the producer. Transport was an important item of cost borne by wholesaler-cum-commission agent and handling was the only item of cost borne by the retailers. The producers share in consumer's rupee in potato and cabbage was 61.39 per cent and 40.42 per cent respectively. The producers share was the highest in case of potato.

Jai Singh Parmar (2003) in his study on marketing operations of Himachal Apples, identified that the popular marketing channel was marketing through a forwarding agency to a commission agent and wholesaler in the wholesale market. The marketing channel involved terminal markets, forwarding agency to a commission agent, wholesaler, retailer and consumer. The produce passed through a number of intermediaries. According to rough estimates the apple grower got approximately 20 per cent of the gross price of the produce. The remaining cost was shared by various cross sections inside and outside the state. These included government by way of packing raw material taxes and sales tax, traders, bankers, insurance companies and the owners of cold storages, etc.

Sudhakar Reddy *et al.* (2008) studied various marketing channel in existence in marketing of kharif and rabi sorghum grain, marketing cost, marketing margin and marketing efficiency in Mahabubnagar district of Andhra Pradesh. The marketing efficiency was analysed by estimating composite index and Shepherd's index. With Shepherd's index of 6.05, marketing channel Producer – Wholesaler - Consumer was most efficient.

Jangid *et al.* (2010) studied price spread and efficiency of henna marketing in western Rajasthan .they identified three marketing channels of henna in Rajasthan.

Channel1: Producer – Village trader- Commission agent- processor/whole saler – Retailer-Consumer. Channel 2: Producer – Commission agent- processor/whole saler – Retailer-Consumer. Channel 3: Producer – processor/whole saler –Retailer-Consumer. They found that marketing cost per quintal of henna was highest (Rs.1336.81) in channel 1, followed by channel 2(Rs.1321.81) and channel 3(Rs.1204.10). The cost of processing and packaging had highest share in total cost which account for 60-66 per cent. The value of quantity loss in different channels was about 20 per cent of total marketing cost. About 7-8 per cent of total marketing cost was contributed by the cost of gunny bags and labour for filling of leaves into it.

Nandeshwar *et al.* (2013) studied economics of vegetable production and price spread in marketing of vegetables. The author observed the Input output ratio was more in onion than others crops but net returns was maximum in case of capsicum. Capsicum cultivation under net shade condition was estimated more gross income. Producer - Wholesaler - retailer - consumer was the important channel through which maximum quantity is sold by the cultivators. Producers share in consumers rupees was highest in Channel III then Channel II and Channel-I. Cost C and Cost B were high as compare to Cost A. High cost of inputs, losses due to climatic changes, uncertainty of prices, disease and pest attack etc. were major constraints faced by vegetable growers during production and marketing of vegetables.

Grema *et al.* (2014) focused on the economic analysis of onion production along river Komadugu area of Yobe State, Nigeria. A multi stage sampling technique was employed for collecting primary data from a sample of one hundred and twenty (120) onion farmers in the study area. Analytical tools used were; descriptive statistics, farm budgeting models and inferential statistics. Findings indicated that most of the out growers are male and Majority were middle age (35-44 years) and have had substantial experience in onion production. The study also found that land size, labour, seed and fertilizer were over utilized for onion production with efficiency ratio greater than one (2.41, 9.37, 6.56 and 2.21) while, insecticide and herbicide were under-utilized for onion production with efficiency ratio of less than one (0.77 and 0.54). Problems associated with high cost of production inputs, lack of adequate storage facilities, limited access to improved seeds, high cost of transport, fluctuation of market price

and lack of sufficient capital among others were some of the problems identified as confronting onion farmers in the study area.

Palanivel *et al* (2015) studied on cultivation and marketing of mangoes in Krishnagiri district. The authors observed Even if the formers produced mangoes they are not able get reasonable price due to various factors such as, local traders quoting very low price; Mango is a perishable good which will not last longer period of time enabling the cultivators to benefit out of the trade. All the mangoes are processed as a mango pulp as the main export product. Producers generally keep away from the marketing of mango fruit by themselves as they do not want to get involved in the complications of the marketing system, the mango producer do not want to take risk of the price along with the income variation due to perishability, qualities of product to seasonal difference and lack of knowledge of marketing mango fruit. This research paper attempts to examine the type of marketing systems existing at present in Krishnagiri District.

4. Constraints in production and marketing

Aiyasamy and Raveendran (1982) analysed the export growth and export prices of turmeric in India and concluded that the very high correlation of export price of turmeric with its domestic prices indicated that the latter was exposed to international trade fluctuations and explained the high uncertainty to farmers, further supported by high coefficient of variation of prices.

Kaul and Abdul (1988), the main constraints in marketing of pineapple in almost all the districts of Meghalaya state were fluctuation in market price, high cost of transportation and substantial wastage during transportation.

Rao and Kamraju (1990) studied the constraints of agriculture growth in Meghalaya. They found that lack of adequate local agricultural research base, insufficient of funds for the agricultural sector specially for agriculture research and education, lack of proper congenial marketing environment, lack of roads to markets lack of processing facilities near by producing centers ultimately resulting in very poor agricultural industry linkage and interactions are the major constraints

responsible for the disturbing and disquieting performance of agriculture in Meghalaya.

Kiresur and Ganesh Kumar (1998) revealed that absence of storage facilities was the major problem expressed by 91.23 per cent of onion growers followed by delay in payment of sale proceeds (89.47%), high commission charges (84.21%), lack of cheapest transport facilities and inadequate infrastructural facilities and civic amenities at the market both expressed by 1970.18 per cent farmers. High charges of Hamali (68.42%), lack of proper grading facilities (61.40%) and faulty weighment system (14.04%) were other problems.

Sehrawat *et al.* (2000) studied that the constraints for promotion of small scale agro processing industries. By using the Garrett's ranking index, the constraints were classified as serious and not serious. The serious problems were unfamiliarity with export activities, lack of market intelligence. Very serious problems were cheaper/superior competitive substitute, inadequate supply of export information and high cost of packaging. Finally not so serious were high import and excise duties on packaging material, seasonal material, seasonal damage and high sales tax on packaging material.

Jain and Chetan (2002) studied the marketing of major horticulture crops in Dharsiwa Block of Raipur. The main objective of study was to identify the different marketing channels involved in marketing of fruits and vegetables, estimate the marketing cost and marketing margins in fruit and vegetable 12 marketing and estimate the marketing efficiency prevailing in different marketing channel. The result of study showed that the area under horticulture crops increased at small and medium farm but decreased at large farm.

Suresh *et al.* (2003) used Garrett's ranking method to rank the constraints faced by the production and marketing of groundnut and it included incidence of pest and disease, erratic rainfall, water scarcity, forest animals, non-availability of good quality seeds, inadequate supply of labour coupled with high wage rate, low level of adoption of recommended technologies, lower marketed surplus, collusion among the traders in marketing, malpractices in weighment and delayed payment.

Namita and Barman (2003), reported that lack of motivation of the small entrepreneurs, poor management, scarcity of packaging materials, high transport cost, inadequate technology, unfair competition and lack of market and product research were some of the constraints that hindered the progress of the agro- processing industry.

Lokesh *et al.* (2005) examined the Economic Analysis of Tomato Production, Marketing and Processing in Karnataka. The study indicated that the productivity had increased, through over years the area under tomato cultivation had remained stagnant. Tomato was cultivated throughout the year; long duration variety is cultivated in Kharif season and short duration variety in summer season. Supply of good quality raw material was not a constraint and hence existing processing units had to be rehabilitated with modern equipment's and quality specifications of national and international standards for the products must be excused for the success and survival of the tomato processing industry. Marketing of the finished products has to be promoted through different media to create awareness among consumers, and in turn increase demand for the produce.

Shiyani and Dhanahalya (2006) revealed the pest, disease, adverse soils, water scarcity/drought, agronomical and socio-economic conditions were the production constraints faced by the cotton cultivators.

Singh and Grover (2007) studied that constraint faced by sesame growers were biotic (diseases, insect/ Pest and weeds), abiotic such as input availability constraints (seed, irrigation, fertilizers, insecticides, pesticides, labour, machinery, credits), environmental constraints (drought, rain, temperature, frost) and marketing constraints (information related to price, and its variability, storage losses, cost on transport).

Gajpara *et al.* (2008) studied problems of regulated markets in Gujarat. They found that major constraint felt by farmer in regulated market were shortage of labour, delay on market process, lack of insurance facilities, lack of grading facilities and lack of market finance. The constraints of traders were inadequate storage facilities, irregular power supply and inadequate transport facilities.

Eswaran and Balasubramanian (2008) studied that the problem of cotton cultivators were non availability godown facilities, getting remunerative price, forced sale, more transport cost and unregulated weighing in Virudhunagar district of Tamil Nadu.

Tingre (2008) stated that lack of market information, high market commission and lack of appropriate grader were the constraints faced by the guava growers.

Rama Rao (2008) studied value addition of sugarcane in north coastal zones of Andhra Pradesh. He used Garrett's ranking technique to rank constraints in jiggery production and marketing. Lack of market price was ranked as most important constraint with mean score value of 70.25 in jiggery marketing. The other important constraints identified were lack of amenities and facilities, lack of grading and proper weighment facilities.

Reddy *et al.* (2008) studied various marketing channel in existence in marketing of *kharif* and *rabi* sorghum grain, marketing cost, marketing margin and marketing efficiency in Mahabubnagar district of Andhra Pradesh. Most of the farmers expressed improper weighing, high commission charges and low prices as the problems. Collusion among the traders in marketing of grain was perceived as major problem.

Samsai *et al.* (2010) used Garrett's ranking technique to identify the constraints faced by the contract farmers. The results indicated that the inadequate loan amount and late disbursement of loan were the major constraints faced by the contract farmers.

Singh and Kailash (2010) studied price spread of Mango in Lucknow district of Uttar Pradesh and identified four marketing channels viz. channel 1: Producer – Pre harvest contractor – Commission Agent – whole saler – Retailer – Consumer. Channel 2 : Producer – Pre harvest contractor – Commission Agent – Retailer – Consumer. Channel 3 : Producer – Pre harvest contractor – whole saler – Retailer – Consumer. Channel 4: Producer – Pre harvest contractor – Retailer – Consumer. They concluded that the majority of the farmers leased out their orchard to the pre harvest contractors. Out of the four channels of Mango marketing channel 4 was the most

efficient as the producer gets as high as 46.09 per cent of the consumer rupee and remaining about 54 per cent was incurred in different marketing cost by retailers / pre harvest contractor.

Rana *et al.* (2014), identified the major constraints faced by farmers in potato cultivation as lack of quality seed, inadequate irrigation facility, uncertainty in potato prices, costly potato inputs, shortage of labour and lack of latest know-how of potato cultivation.

Palanivel *et al.* (2015) studied on cultivation and marketing of mangoes in krishnagiri district. The authors concluded that the farmers cultivating mangoes in krishnagiri district are to face lot of practical difficulties both in production and marketing of mangoes. The difficulties comprises of lack of proper irrigation system and lack of proper pest control system in the production level and lack of proper storing system in the storage level to avoid the products perishing in a very short span of time and local traders influencing the market thus bring down the price level affecting the mango farmers. Hence the farmers are trying to avert visiting markets to market their products and thus landing in the clutches of the unruly middlemen.



MATERIALS AND METHODS

This chapter explains the methodological framework used in the study. More specifically, this chapter deals with the sampling design, methods of data collection and measurement of variables and the analytical tools used.

3.1 Sampling design

Warangal district was purposively selected, as it is stands second position in both area and production of turmeric cultivation in Telangana. Among the mandals in Warangal district, three mandals viz., Nekonda, Sangem and Kesamudram purposively have taken for the study. In Nekonda mandal two villages have taken randomly and the name of the villages were Pattipaka and mudigonda. In Sangem mandal two villages have taken randomly and the name of the villages were Mondrai, and Teega raju pally. In Kesamudram mandal two villages were taken randomly and the name of the villages were Pallaruguda and Narlavi. Ten farmers were selected from each of the three selected mandals and thus the total sample size was 30. The intermediaries involved in marketing of turmeric namely local trader, commission agent, wholesaler, wholesaler-cum-processors and retailer-cum-processors were also selected at the rate of two from each category making the total sample size 10. Thus the total sample included 30 farmers and 10 intermediaries.

3.2 Data collection

The present study is based on both the primary and secondary data. The primary data required for the study were collected through personal interview with the help of a pre-tested schedule. Two separate sets of interview schedules were prepared, one for farmers and another one for the intermediaries. The questionnaires for the study were designed taking into consideration of physical, cultural and socio-economic environment of turmeric production and marketing in the study area and the questionnaires were pre-tested and finalized. The interview schedule for farmers covered aspects such as general farm and household characteristics, socio economic

parameters like education, primary and secondary occupation, details on cultivation practices adopted in turmeric cultivation and cost of cultivation, details on marketing of turmeric, problems in production and marketing, etc. The schedule for intermediaries covered aspects such as general characteristics, quantity and quality of turmeric handled, reasons for preference of a particular marketing channel, and the problems faced, etc. The data thus collected were subjected to conventional as well as functional analysis to attain the objectives set out for the study.

3.3 Measurement of variables

Turmeric production

a) Planting material

Turmeric is propagated through rhizomes. The quantity of seed material has been Obtained directly from the farmers. The cost of rhizomes was arrived at by multiplying the Quantity of rhizomes used by the sample farmer and the price of the rhizomes.

b) Human labour

Human labour was measured in terms of number of days separately for men and women. The amount of permanent and hired labour was treated alike and converted to common physical unit (man days of eight hours). Family labour were considered separately and added to the hired labour to calculate the total labour requirement.

c) Machine power

Machine power was valued using the prevailing rates of custom-hiring in the selected villages.

d) Manures, fertilizers and plant protection chemicals

The data on chemical fertilizers were collected on individual fertilizers used in turmeric production. Fertilizers and plant protection chemicals were valued at the actual price paid and farm produced manure was valued at the prevailing market rates

e) Irrigation

The irrigation variable was quantified in terms of the number of irrigation since the depth of irrigation does not show much variation across farms. Irrigation cost included labour cost for irrigating the field (mostly family labour) as well as other costs pertaining to operation and maintenance of pump sets and other irrigation structures used by the sample farmers for irrigating turmeric field.

3.4 Tabulation and Analysis

After collecting the field data from the selected farmers, the next step was to process the raw data and arrange them in tabular form. The collected data were transferred under different heads of separate square sheets with respect to different size groups. Latter on the data implying to actual plot size were converted into per hectare basis on mater-sheets. Subsequently different tables were prepared with a view to fulfill the various objectives of the study. The entire information of the survey was presented with a view to provide a base for purposeful analysis and interpretation of the findings.

3.5. Analytical tools:

The analytical techniques used in the study are presented below:

3.5.1 Cost concepts:

Cost concepts such as Cost A1, Cost A2, Cost B and Cost C have been considered in the present study. These cost concepts are used to derive the farm efficiency measures such as farm business income, farm family labor income, farm investment income etc.

Cost A1:

Cost A1 includes all the paid out expenses whether incurred by the owner cultivator in cash or kind. Various expenses included in Cost A1 are value of hired human labour, bullock labour, machine labour, seeds, plant protection chemicals, manures and fertilizers, irrigation charges, depreciation, land revenue, interest on working capital and other miscellaneous expenses.

Cost A2:

Cost A2 was obtained by adding actual rent paid for leased-in-land by the tenant cultivator to Cost A1.

Cost B:

Cost B was obtained by adding imputed rental value of owned land and interest on fixed capital Cost A2.

Cost C:

Cost C was estimated by adding the imputed value of family human labour to cost B. This gives the total cost of cultivation.

3.5.2 Returns:

For returns analyses following measures as suggested by Dhondyal (1973) were used:

1. Gross returns = Value of the main product
2. Farm business income = Gross income – Cost A
3. Family labour income = Gross income – Cost B
4. Net income = Gross income – Cost C
5. Farm investment income = Farm business income – Wages of family labour

3.5.3 Price Spread Analysis

Information on prices prevailed and the costs involved in marketing of turmeric at Different stages of marketing channel were collected from the farmers and traders. The costs of marketing included transport, weighing, loading and unloading, packing, storage, losses due to spoilage, and other incidental expenses incurred for marketing the produce. In the process of marketing of turmeric, the difference between price paid by the consumer and that received by the turmeric producer for an equivalent quantity of turmeric was defined as “price spread”. Data on profits of the various market functionaries involved in moving the produce from the initial point of production till it reached the ultimate consumer were collected. In this study, sum-of-average gross margin method was used in the estimation of price spread.

a. Sum-of-Average Gross Margin Method

The average gross margins of all the intermediaries were added to obtain the total marketing margin as well as the breakup of the consumer's rupee.

$$MT = \sum_{i=1}^n \frac{[S_i - P_i]}{Q_i}$$

Where,

MT = Total Marketing Margin

S_i = Sale value of a product for i intermediary

P_i = Purchase value paid by the i intermediary

Q_i = Quantity of the product handled by the i intermediary

i = 1, 2, 3 ... n (Number of intermediaries involved in the supply chain)

b. Farmer's Share in Consumer Rupee

$$Fs = \frac{Fp}{Cp} \times 100$$

Where,

Fs = Farmer's share in consumer rupee (percentage)

Fp = Farmer's price

Cp = consumer's price

3.5.4 Marketing efficiency:

Marketing efficiency is essentially degree of market performance. In this sense the concept is broad and dynamic. The movement of goods from producers to the ultimate consumers at the lowest possible cost consistent with the provision of service desired by the consumers is termed as efficient marketing.

a. Acharya's Approach

According to Acharya (2003), an ideal measure of marketing efficiency, particularly for comparing the efficiency of alternate markets channels should take into account all of the following:

$$ME = FP \div (MC + MM)$$

Where:

Total marketing costs (MC)

Net marketing margin (MM)

Prices received by the farmer (FP)

Prices paid by the consumer (RP)

Further, the measure should reflect the following relationship between each of these variables and the marketing efficiency.

Higher the (a), the lower the efficiency

Higher the (b), the lower the efficiency

Higher the (c), the higher the efficiency

Higher the (d), the lower the efficiency

As there is an exact relationship among four variables, i.e. $a+b+c = d$, any three of these could be used to arrive at a measure for comparing the marketing efficiency.

b. Shepherd's Formula

Shepherd (1965) suggested that the ratio of total value of goods marketed to the marketing cost could be used as a measure of marketing efficiency. The higher this ratio, higher would be the efficiency and vice versa. This can be expressed in the following form:

$$ME = [(V/I)-1]$$

Where,

ME = Index of marketing efficiency

V = Value of goods sold

I = Total marketing cost

c. Calkin's index

The Calkin's index of marketing efficiency is estimated using the following formula.

$$\text{Marketing efficiency} = 1 + \left(\frac{\text{Sum of profit or margin}}{\text{Sum of marketing cost}} \right)$$

The lower the value of the index, higher would be the efficiency.

3.5.5 Marketing cost:

Marketing cost, incurred on marketing either in cash or in kind by the producer seller and by the various intermediaries involved in the sale and purchase of the commodity till the commodity reaches the ultimate consumer, may be computed as follows:

$$C = CF + C_{m1} + C_{m2} + C_{m3} + \dots + C_{mn}$$

Where,

C = Total cost of marketing of the commodity

CF = Cost paid by the producer from the time the produce leaves the farm till he sells it, and

C_{mi} = Cost incurred by the i th middleman in the process of buying and selling the product.

3.6 Garrett's ranking technique:

Garrett's Ranking Technique is used to rank the important problems faced by the growers of turmeric cultivation. The collected pieces of information from the respondents of growers are arranged and converted into mean score values which are in turn ranked using Garrett's Ranking Technique.

$$\text{percent position} = \frac{100(R_{ij} - 0.05)}{N_j}$$

Where,

R_{ij} =Ranking given to the i^{th} attribute by the j^{th} individual

N_j = Number of reasons ranked by the j^{th} individual

By referring to the Garrett's table, the percent positions estimated were converted into scores. Thus, for each factor the scores of the various respondents were added and the mean values were estimated. The mean values thus obtained for each of the attributes were arranged in descending order. The attributes with the highest mean value was considered as the most important one and the others followed in that order.



RESULTS AND DISCUSSION

In this chapter, the results of analysis are presented and discussed under the following sections.

- General characteristics of the sample farmers
- Production function analysis of turmeric
- Marketing of turmeric
- Constraints in production and marketing of turmeric.

General characteristics of the sample farmers

A brief description of the characteristics of the sample farmers would provide the necessary setting for the discussion. Therefore, the demographic features, occupational pattern, land holding pattern and experience in farming as well as in turmeric cultivation of the respondents are discussed below.

4.1. Family size of sample farm households

The family size of the sample farmers are given in Table 4.1.

Table: 4.1. Family size of sample farm households

S. No.	Family members	Number	Percent to total	Average family size
1.	Small (<4)	10	33.33	3.65
2.	Medium (4-5)	12	40.00	4.26
3.	Large (> 5)	8	26.67	5.79
Total		30	100	4.46

It could be seen from table no 5.1 that among the turmeric producers 40 percent of the households had medium size family with four to five persons per family, 33.33 percent of the households had less than four members per household and about 26.67 percent were larger families with more than five persons. The average family size of all sample farmers was 4.46.

4.2. Annual income of sample farm households

The sample households were post-stratified into three different groups based on the annual income. Households with annual income of below Rs 1 lakh were categorized as low income group, households with annual income between Rs 1 lakh and Rs. 5 lakh were included under middle income group and those with annual income exceeding Rs. 5 lakh were included under high income group. Details regarding the distribution of households in three different income groups and their percentage share to total number of sample households are furnished in Table 4.2.

Table 4.2. Distribution of households based on annual income

S. No.	Annual income	Number	Percent to total	Average annual income (Rs)
1.	Upto 1,00,000	10	31.1	42,131
2.	1,00,000 - 5,00,000	8	27.7	67,535
3.	> 5,00,000	12	41.2	135,548
Total		30	100.00	87,592

The low income group had 10 households accounting for 31.1 percent of the total sample, the middle income group had 8 households accounting for 27.7 percent and the high income group had 12 households accounting for 41.2 percent of total sample households. The average annual income of households was Rs. 42131, Rs. 67535, Rs. 135548 for low, middle and high income groups. The average annual income for all the sample households was Rs. 87592.

4.3. Educational Status

Educational status of the sample farmers also an important factor influencing the decision-making behavior to greater extent. The details on educational status of the sample farm households under different income categories are presented in Table 4.3

Table 4.3. Educational status of heads of sample farm households

S.NO	Education	Less than Rs. 1,00,000	Rs 1,00,000 to Rs 5,00,000	More than Rs 5,00,000
1	Illiterate	2 (20.00)	1 (12.50)	0 (0.00)
2	Primary	3 (30.00)	2 (25.00)	3 (25.00)
3	Secondary	4 (40.00)	4 (50.00)	6 (50.00)
4	Intermediate	1 (10.00)	1 (12.50)	3 (25.00)
Total		10 (100.00)	8 (100.00)	12 (100.00)

It can be observed from the table 4.3 that in the high income category (more than Rs. 5, 00,000) all members are educated between secondary to graduate level. Out of 10 households in low income category (less than Rs. 1, 00,000) seven households accounting for 20 percent of households were illiterate, 40 percent of households had secondary education and 10 percent of households had intermediate education. In middle income category (Rs. 1, 00,000 – Rs. 5,00,000) which had a total of 8 households, 12.50 percent of households were illiterate, 50 percent of households had secondary education and 12.50 percent of households had intermediate education. In the high income category (> Rs.5,00,000) which had a total number of 12 households, no one is illiterate, 50 percent of households had secondary education and 25 percent of households had intermediate education.

4.4. Age Distribution

Age of the head of farm households has been found to be an important determination of production decisions of the farmers in many studies. The details of age distribution are given in Table 4.4.

Table 4.4. Age of heads of sample farm households

S. No.	Age	Number	Percentage
1.	Below 30 years	2	7
2.	31- 40 years	16	53
3.	41- 50 years	7	23
4.	Above 50 years	5	17
Total		30	100

The results furnished in Table 4.4 shows that among the sample farm households, 16 percent were in the age group of 31-40 years, 7 percent of the heads of the sample households were in the age group of 41-50 years, 5 percent were in the age group of more than 50 years and two percent were in the age group of below 30 years.

4.5. Experience in turmeric cultivation

The experience of the farmers in turmeric cultivation is furnished in Table 4.5. It could be seen from the Table 4.5 that 70 percent of the turmeric producers in the sample had an experience of 10-25 years in turmeric production, 16 percent had more than 25 years of experience, and 13 percent had an experience of less than 10 years.

Table 4.5 Experience in turmeric cultivation

S.No.	Experience in years	Number	Percentage
1.	< 10 years	4	13.3
2.	10 - 25 years	21	70
3.	> 25 years	5	16.6
Total		30	100

4.6. Land holding pattern

Land holding pattern plays an important role in determining farm income, cultivation practices, production efficiency, as well as marketing of farm produces.

Table 4.6 Land holding pattern of sample farm households

S. No.	Farm size (ha)	Number	Percentage	Average farm size (ha)
1.	Marginal (<1)	9	30.00	0.89
2.	Small (1-2)	10	34.45	1.27
3.	Large (>2)	11	35.55	3.56
Total		30	100	1.97

Among the sample farmer, marginal farmers constituted 30 percent, small farmers constituted 34.45 percent and large farmers constituted 35.55 percent. The average size of marginal, small and large farms were 0.89, 1.27 and 3.56 respectively. The average farm size for the sample as a whole was about 2.00 ha.

4.7. Livestock holding of the sample farmers

Livestock is an important source of income for farm families. Income from livestock is a continuous and less fluctuating one. Adding livestock to cropping system significantly reduces the risks associated with farm income. The livestock

products like meat, milk and milk products have a prominent role in the dietary habits of the people.

It also provides avenue for income generation particularly for agricultural labours besides supplying farmyard manure and raw materials for biogas production. Further, it provides employment especially self-employment to a substantial number of rural and urban population.

Hence the details of livestock population are discussed in this section. Table 4.7 elaborates information about livestock population among the sample farmers.

Table 4.7 Livestock holding of the sample farmers

S. No.	Category	Number	Percentage
1.	Cow	60	33.30
2.	Buffalo	26	14.90
3.	Bullock	4	1.80
4.	Goat	90	50.00
Total		180	100.00

It could be observed from the above table that the farm households showed higher preference towards rearing goat and cow. They constitute 50 percent and 33.3 percent respectively, buffalo and bullock constitute 14.9 percent and 1.8 percent respectively. Buffalo and bullock population are at the declining trend in the region and this is reflected by the population of these categories of livestock in the sample farm households.

The high maintenance costs and increasing scarcity of fodder associated with mechanization of ploughing operations are the major reasons for the diminishing population of these two categories of livestock.

4.8 Turmeric cultivation in sample farmers

The turmeric was cultivated during June-July and harvested during February-March. The treated rhizomes were dibbled in the sides of ridges, 45cm apart at 15cm spacing at a depth of 4cm. Initially 10 tonnes of farmyard manure was applied for a hectare. Urea, DAP and potash fertilizers were applied as basal dose and top dressing. Weeding may be done thrice at 60, 120 and 150 days after planting depending upon weed intensity. The plants usually start lodging in about nine months. Yellowing and drying of leaves are the signs of crop maturity. The rhizomes are picked after digging deeply with spade or digging forks.

Details of different quantities of inputs used by the turmeric cultivators are furnished in Table 4.8

Table 4.8 Quantity of inputs used in turmeric cultivation

S. No	Inputs	Marginal farmers	Small farmers	Large farmers	Over all average
1.	Planting material (kg/ha)	247.85	247.85	247.85	247.85
2.	Labour (man days/ha)	850	809	731	793.56
3.	Organic manure (tonnes/ha)	29.7	19.7	14.78	21.39
4.	Inorganic fertilizer (kg/ha)	2242	1242	3042	2182
5.	Machine power (hrs/ha)	21	22.5	23	22.22
6.	Plant protection chemical (l/ha)	0.5	1.25	2.5	1.46
7.	Number of irrigations/ha	127	116	124	123

4.9. Economics of turmeric cultivation

In order to understand the economics of turmeric production in Warangal district, the cost of production for turmeric was estimated and discussed in this section. Out of 30 respondents in Warangal district, 9 farmers were marginal land holders, 10 were small and 11 were large farmers.

Cost of cultivation was calculated on per hectare basis separately for these three groups of farmers.

Table 4.9 cost of cultivation of turmeric for sample farmers

(Rs/ha)

S.No.	Cost Components	Marginal (n=9)	Small (n=10)	Large (n=11)	Overall
1.	Labour	28252 (42.01)	26100 (46.53)	25136 (45.24)	26451 (44.57)
2.	Cost of rhizomes	8262 (12.26)	9180 (14.25)	8520 (15.33)	8262 (13.92)
3.	Transporting charges	2405 (3.57)	2328 (4.15)	2480 (4.46)	2405 (4.05)
4.	Organic manure	9928 (14.73)	6382 (11.38)	5082 (9.15)	7002 (11.80)
5.	Fertilizers and plant protection chemicals	6738 (10.00)	4908 (8.75)	8324 (14.98)	6638 (11.19)
6.	Herbicide	1774 (2.63)	910 (1.62)	569 (1.13)	1072 (1.81)
7.	Interest on working capital	6412 (9.51)	5392 (9.61)	4983 (9.82)	5561 (9.37)
8.	Depreciation + Interest on fixed capital+ Land revenue	3568 (5.29)	2075 (3.70)	412 (0.74)	1951 (3.29)
9.	Total variable cost	63837	54015	55151	57391

10.	Total fixed cost	29652	14556	3373	15987
11.	Total Cost	67407 (100.00)	56091 (100.00)	55565 (100.00)	59342 (100.00)
12.	Gross returns	301600	309200	329200	313333
13.	Net returns	2,34,193	2,53,109	2,73,635	253645
14.	Cost of production/kg	26.81	22.49	19.64	22.98

Note: Figures in parentheses are percentages to total cost.

From the Table 4.9 it could be observed that the total cost of production varied considerably and it was lower for large farmers. The total cost of production was Rs. 67,407 for marginal farmers, Rs. 56,091 for small farmers and Rs. 55,565/ha for large farmers. Cost of production per kg also showed a decreasing trend as the size of the farms increased. It was Rs. 26.81, Rs. 22.49 and Rs. 19.64 respectively. This is probably due to increase in the efficiency in use of resources in large farms together with economies of scale in production. Gross returns per hectare was the highest for large farmers (Rs. 301,600) when compared with small (Rs. 309,200) and marginal (Rs. 329,200) farmers.

The net returns per hectare showed an increasing trend as the size of the farms increased. It was Rs. 2,34,193 Rs. 2,53,109 and Rs. 2,73,635 respectively in these farms. The net return per hectare was the highest for large farmers because the cost of production per hectare was less for large farms when compared with small and marginal farms. The gross return obtained by the large farm was also high. This can be inferred to arise from economies of scale in production in large farms.

4.10. Production function analysis

The results of the production function analysis relating to yield of turmeric and factors influencing it are given in Table 4.10

Table 4.10. Results of Cobb-Douglas production function for turmeric
Dependent variable: Turmeric yield (kg / ha)

S.No.	Explanatory variables	Regression coefficient	Standard error	t-value
1.	Constant	0.062651***	0.287295	2.892563
2.	Rhizome(kg)	0.03733**	0.019979	1.998454
3.	Labour(man days)	0.23548***	0.063535	3.706297
4.	Organic manure(kg)	0.071756**	0.034489	2.080574
5.	Inorganic fertilizers(kg)	0.043707**	0.0297	2.071639
6.	Irrigation(numbers)	0.204082***	0.025522	7.996205
7.	Cost of plant protection(Rs)	0.001807	0.004809	0.375709

$$R^2 = 0.76$$

$$N = 30$$

$$F = 290.38$$

*** Significant at 1% level

** Significant at 5% level

The results indicated that the R^2 (coefficient of multiple determination) was 0.76 implying that 76 percent of the variation in the dependent variable (turmeric yield) was accounted for by the independent variables selected for the study. The independent variables viz., human labour and irrigation were significant at one percent level of probability.

This implied that an increase in use of labour by one percent, *ceteris paribus*, would increase yield of turmeric by 0.23 percent and an increase in number of irrigations by one percent *ceteris paribus* would increase the yield by 0.20 percent.

The regression coefficients for seed material (rhizome), organic manure and inorganic fertilizer used in turmeric cultivation were significant at five percent level of probability. An increase in organic manure by one percent *ceteris paribus* would increase the yield by 0.07 percent from the geometric mean level. An increase in seed

material applied by one percent *ceteris paribus* would increase the yield by 0.04 percent from the geometric mean level. The variables cost of weed control and cost of plant protection turned out to be non-significant. This result was in line with the results of Chinnappa and Ramanna (1997) who stated farmers should reduce expenditure on plant protection chemicals and increase the usage of labour to increase production.

The marginal value product (MVP), marginal input cost (MIC) and the ratio between these two were worked out for each input to understand the efficiency of input use. The results are given in Table 4.11.

Table 4.11.MVP/MIC Ratio for inputs used

S. No	Inputs	MPP	MVP	MIC	MVP/MIC Ratio
1.	Rhizome	0.012972	51.88847	10	5.18
2.	Labour	0.055553	222.2136	105	2.11
3.	Organic manure	0.000373	1.492767	1	1.49
4.	Inorganic manure	0.008346	33.38547	5	6.67

The input is used efficiently if the ratio between MVP and MIC is one. A ratio of more- than-one and less-than-one would indicate under-utilization and over-utilization respectively.

From the Table 4.11 it could be seen that the ratio was found to be greater than one for quantity of rhizome, quantity of organic manure, labour and quantity of inorganic fertilizer, which indicated the under-utilization of these inputs which implies that there is a scope for increasing productivity of resources in turmeric cultivation.

4.12. Marketing of turmeric

In Warangal district turmeric has been cultivated more than thirty years. In earlier days the producers of turmeric marketed their produce mainly through commission agents. After 1980s, to regulate the marketing of turmeric, the

government started the regulated market, which resulted in significant benefits to farmers in easily marketing their produce. In spite of this, many farmers are still marketing their produce through commission agents. The Warangal Agriculture Marketing Society is also involved in marketing of turmeric. In order to understand the marketing practices and problems in marketing of turmeric, the market channel through which it was marketed was traced and the marketing efficiency was worked out.

There were four marketing channels through which turmeric was marketed. Hence, to know the efficiency of marketing channel, price spread and marketing efficiency were worked out and the results are presented in Tables 4.12 through 4.15.

4.12.1. Major Marketing channels of Turmeric

Turmeric generally becomes ready for harvest during January - February in the region. The turmeric producers can sell their produce either through commission agents or through Agriculture marketing society or through regulated market. The wholesalers and retailers buy the turmeric from the above intermediaries. The wholesalers and retailers themselves acted as processors.

The following four marketing channels were identified in the study area.

Channel I

Producer —► Commission Agent —► Wholesaler —► Retailer —► Consumer
--

Channel II

Producer —► Commission Agent —► Retailer —► Consumer
--

Channel III

Producer —► Regulated Market —► Wholesaler —► Retailer —► Consumer
--

Channel IV

Producer —► Regulated Market —► Retailer —► Consumer
--

4.12.2 Price Spread

The information on price spread in the turmeric marketing channel are provided in tables 4.12 through 4.15 for all the six marketing channels through which turmeric was marketed.

Table 4.12 Price Spread of turmeric in Market channel I

S.No	Particulars	Amount (Rs.)	Percent
1	Producer		
A	Gross price received	4000	44.44
I	Polishing	30	0.33
ii	Packing	10	0.11
iii	Loading/ unloading	10	0.11
iv	Transport cost	25	0.28
v	Commission Charges	250	2.78
vi	Weighing charges	10	0.11
vii	Spoilage loss	0	0.00
B	Marketing cost	335	3.72
C	Net price received	3665	40.72
2	Commission Agent		0.00
3	Wholesaler cum Processor		0.00
A	Purchase price	4000	44.44
I	Transport cost	100	1.11
ii	Weighing charges	300	3.33
iii	Spoilage loss	400	4.44
iv	Processing cost	200	2.22
B	Marketing cost	1000	11.11
C	Profit Margin	3200	35.56
D	Marketing Margin	4200	46.67
E	Sale price	8200	91.11
4	Retailer cum Processor		0.00
A	Purchase price	8200	91.11
i	Sorting/Grading	0	0.00
ii	Transport cost	100	1.11
iii	Spoilage loss	0	0.00
B	Marketing cost	100	1.11
C	Profit Margin	700	7.78
D	Marketing Margin	800	8.89
E	Sale price	9000	100.00
5	Price paid by the Consumer	9000	100.00
6	Price Spread	5335	59.28

Table 4.13. Price Spread of turmeric in Market channel II

S. No	Particulars	Amount (in Rs)	Percent
1	Producer		
A	Gross price received	4000	66.67
i	Polishing	30	0.50
ii	Packing	10	0.17
iii	Loading/ unloading	10	0.17
iv	Transport cost	25	0.42
v	Commission Charges	250	4.17
vi	Weighing charges	10	0.17
vii	Spoilage loss	0	0.00
B	Marketing cost	335	5.58
C	Net price received	3665	61.08
2	Commission Agent		0.00
3	Retailer cum Processor		0.00
A	Purchase price	4000	66.67
i	Transport cost	100	1.67
ii	Weighing charges	100	1.67
iii	Spoilage loss	400	6.67
iv	Processing cost	200	3.33
B	Marketing cost	800	13.33
C	Profit Margin	1200	20.00
D	Marketing Margin	2000	33.33
E	Sale price	6000	100.00
4	Price paid by the Consumer	6000	100.00
5	Price Spread	2335	38.92

Table 4.14. Price Spread of turmeric in Market channel III

S.No	Particulars	Amount (Rs.)	Percent
1	Producer		
A	Gross price received	4000	44.44
i	Polishing	30	0.33
ii	Packing	10	0.11
iii	Loading/ unloading	10	0.11
iv	Transport cost	25	0.28
V	Commission Charges	0	0.00
vi	Weighing charges	10	0.11
vii	Spoilage loss	0	0.00
B	Marketing cost	85	0.94
C	Net price received	3915	43.50
2	Regulated Market		0.00
3	Wholesaler cum Processor		0.00
A	Purchase price	4000	44.44
i	Transport cost	100	1.11
ii	Weighing charges	300	3.33
iii	Spoilage loss	400	4.44
iv	Processing cost	200	2.22
B	Marketing cost	1000	11.11
C	Profit Margin	3200	35.56
D	Marketing Margin	4200	46.67
E	Sale price	8200	91.11
4	Retailer cum Processor		0.00
A	Purchase price	8200	91.11
i	Sorting/Grading	0	0.00
ii	Transport cost	100	1.11
iii	Spoilage loss	0	0.00
B	Marketing cost	100	1.11
C	Profit Margin	700	7.78
D	Marketing Margin	800	8.89
E	Sale price	9000	100.00
5	Price paid by the Consumer	9000	100.00
6	Price Spread	5085	56.50

Table 4.15. Price Spread of turmeric in Market channel IV

S.No.	Particulars	Amount (Rs.)	Percent
1	Producer		
A	Gross price received	4000	72.73
i	Polishing	30	0.55
ii	Packing	10	0.18
iii	Loading/ unloading	10	0.18
iv	Transport cost	25	0.45
v	Commission Charges	0	0.00
vi	Weighing charges	10	0.18
vii	Spoilage loss	0	0.00
B	Marketing cost	85	1.55
C	Net price received	3915	71.18
2	Regulated Market		0.00
3	Retailer cum Processor		0.00
A	Purchase price	4000	72.73
i	Transport cost	100	1.82
ii	Weighing charges	100	1.82
iii	Spoilage loss	400	7.27
iv	Processing cost	200	3.64
B	Marketing cost	800	14.55
C	Profit Margin	700	12.73
D	Marketing Margin	1500	27.27
E	Sale price	5500	100.00
4	Price paid by the Consumer	5500	100.00
5	Price Spread	1585	28.82

It could be observed from the Table 4.12 that in the marketing channel I, the price received by the farmer was Rs. 3665/quintal, which constituted about 40 percent of the consumer price. The marketing cost incurred by the wholesaler accounted for about 14 percent of final price and by the retailer was about one percent of final price. The wholesaler received a considerable margin of up to 35.56 percent of consumer price, while the retailer received 7.78 percent of the consumer price.

In marketing channel II, the producers received about 61 percent of the consumer price. The marketing cost incurred by the retailer was 13.3 percent of the consumer price and the retailer got 20 percent of the consumer's price as profit margin.

In marketing channel III, the price received by the farmers was Rs 3915/quintal, which constituted about 43 percent of the consumer price. The marketing costs incurred by the wholesaler accounted for about 14 percent of the final price paid by consumers. The wholesaler received a considerable margin of up to 35.5 percent of consumer price, while the retailers received 7.7 percent of the consumer price.

In marketing channel IV, the producers received about 72 percent of the consumers' price. The marketing cost incurred by the retailer was 14.5 percent of the consumer price and the retailer received 12.7 percent of the consumer's price as profit margin.

The analysis showed that in market channel IV, the price spread was low due to the less number of intermediaries, and also in market channel IV the producers obtained about 72 percent of the consumers' price.

4.12.3. Marketing Efficiency

Marketing is said to be efficient if the total marketing margins are higher per unit of marketing cost. The marketing efficiency of different marketing channels for turmeric was estimated using the following three methods. More than one method was used to check the accuracy of the efficiency.

1. Shepherd method
2. Acharya's approach
3. Calkin's index

The results of the Shepherd method and Acharya's approach are furnished in the following tables.

Table 4.16. Marketing Efficiency of turmeric through Shepherd method

S.No.	Market Channel	Value of goods sold	Total marketing cost	Marketing Efficiency
1	Market Channel I	9000	1735	5.18
2	Market Channel II	6000	1135	5.28
3	Market Channel III	9000	1485	6.06
4	Market Channel IV	5500	885	6.21

Table 4.17. Marketing Efficiency of turmeric through Acharya's approach

S.No	Market Channel	Net price received by the farmer	Marketing cost + Marketing margin	Marketing Efficiency
1	Market Channel I	3665	5635	0.69
2	Market Channel II	3665	2335	1.80
3	Market Channel III	3915	5385	0.73
4	Market Channel IV	3915	785	4.98

Calkin's index

The Calkin's index of marketing efficiency are presented in Table 4.18

Table 4.18. Marketing Efficiency of turmeric by using Calkin's index

S.No.	Market Channel	Sum of profit or margin	Sum of marketing cost	Marketing Efficiency
1	Market Channel I	3900	1435	3.71
2	Market Channel II	1200	1135	2.06
3	Market Channel III	3900	1185	4.29
4	Market Channel IV	700	885	1.79

The results of marketing efficiency presented in Table 4.18 and 4.19 revealed that the marketing efficiency was relatively higher in marketing channel IV in both the approaches, i.e. 6.21 in Shepherd's method and 4.98 in Acharya's approach.

The result of Calkin's index provided in Table 4.18 shows that the Calikin index is low for the marketing channel IV. Thus the results revealed that the marketing channel in which the intermediaries were low had the highest efficiency. These results were found to be in line with the results of Naval Kishor Meena *et al.* (2009) and Anupama Toppo *et al.* (2010). Thus channel IV found out to be the most efficient channel.

4.13. Constraints in Turmeric cultivation by sample farmers

The problems faced in turmeric cultivation by the sample farmers were quantified using Garrett's ranking and the results are presented in Table 4.19.

The producers expressed that the pest and disease attack was the most important problem (70.67). This result was in line with the findings of Balaji (2003), Dhanahalya and Shiyani (2006) and Grover and Singh (2007) who stated that pest and disease as the top most problem in groundnut, cotton and sesame respectively. This followed by low price (61.23). The next important reason was water scarcity (51.25) followed by cost of fertilizers and plant protection chemicals (45.75). The fifth important Problem faced by the turmeric producers was high labour cost(40.89).

Table 4.19. Problems faced in turmeric cultivation by sample farmers

S.No.	Problems	Score	Rank
1.	Pest and disease attack	70.67	I
2.	Low price	61.23	II
3.	Water problem	51.5	III
4.	Cost of fertilizers and plant protection chemicals	45.75	IV
5.	High labour cost	40.89	V

4.14. Problems in marketing of turmeric by sample farmers

The farmers were asked to rank the problems faced by them in marketing and the results are presented in Table 4.20.

Table 4.20. Problems faced in marketing of turmeric by sample farmers

S.No.	Problems	Score	Rank
1	Price fluctuation	65.67	I
2	Storage cost	56.23	II
3	Low price	44.94	III

The farmers ranked price fluctuation as the most important problem followed by storage cost and low price. This result was in conformity with the results of Abdul and Kaul (1988) who listed price fluctuation as foremost problem of pineapple marketing in Meghalaya. The results indicate the need for development and promotion of storage facilities would indirectly help to stabilize the prices.

4.15. Problems faced by Intermediaries

The intermediaries were asked to rank the problems faced by them in turmeric marketing and the results presented in Table 4.21.

Table4.21. Problems Faced by Intermediaries

S.No.	Problems	Score	Rank
1	Lack of quality	64.56	I
2	Poor storage facility	53.48	II
3	High handling cost	39.15	III

The producers expressed that the lack of quality was the most important problem (64.56) followed by poor storage facility (53.48). The next important problem was high handling cost (39.15).



SUMMARY AND CONCLUSION

Turmeric is extensively used as a spice, food preservative and colouring material in India, China and South East Asia. It also considered as auspicious and is a part of religious rituals. It has been used in traditional medicine as a household remedy for various diseases. India contributes about 78 per cent of the world production and 60 per cent of the world trade in turmeric. The increasing demand for natural product as food additives makes turmeric an ideal producer as a food colourant. India is a dominant player in the global market as far as turmeric is concerned. In view of the economic importance of turmeric in both national and farm economy and the problems faced by farmers in production and marketing of turmeric the present study was taken up with the following specific objectives.

- To study the economics of production of turmeric in Warangal district,
- To identify and evaluate marketing channels for turmeric in the study area,
- To identify constraints in production and marketing of turmeric in the study area.

Turmeric is grown in 14,728 hectares in Warangal district, which occupies the second position in area under turmeric cultivation in the state of Telangana state. This district occupies the second position in both area and production next to Nizamabad district in the state under turmeric. Thus Warangal district was selected for the study. Among the mandals in Warangal district, three mandals viz., Nekkonda, Sangem and Kesamudram purposively have taken for the study. In Nekkonda mandal two villages have taken randomly and the name of the villages were Pattipaka and mudigonda. In Sangem mandal two villages have taken randomly and the name of the villages were Mondrai and Teega raju pally. In Kesamudram mandal two villages were taken randomly and the name of the villages were Pallaruguda and Narlavi. Ten farmers were selected from each of the three selected mandals and thus the total sample size was 30. The intermediaries involved in marketing of turmeric namely

local trader, commission agent, wholesaler, wholesaler-cum-processors and retailer-cum-processors were also selected at the rate of two from each category making the total sample size 10. Thus the total sample included 30 farmers and 10 intermediaries.

For conducting the market study, different intermediaries in the different market channels were contacted. The primary data required for the study were collected through personal interview with the help of a pre-tested comprehensive interview schedule.

Two separate schedules were prepared, one for the farmers and the other for the market functionaries. The data collected were tabulated, processed and subjected to statistical analysis.

General characteristics of sample farmers

Majority of the sample farmers were in the age group of 31-40 years and forty per cent of the sample farmers had medium sized families. Majority of the sample farmers (41.2) had annual income of more than rupees five lakh and more than 90 per cent of the sample farmers were literates. Further more than 50 per cent of the sample farmers had secondary education. About 78 per cent of the sample farmers had experience of 10 to 25 years and most of the farmers had livestock as a supplementary activity.

Economics of production of turmeric

Cost of cultivation per hectare was estimated separately for marginal, small and large farmers among the sample respondents.

The total cost of production was Rs. 67407 for marginal farmers, Rs. 56091 for small farmers and Rs. 55565 for large farmers. Cost of production per kg also showed a decreasing trend as the size of the farms increased. It was Rs.26.81, Rs.22.49 and Rs. 19.64, respectively. Gross returns per hectare was the highest for large farmers (Rs329200) when compared with small (Rs. 309200) and marginal (Rs 301600) farmers.

The net returns per hectare showed an increasing trend as the size of the farms increased. It was Rs. 2,34,193, Rs.2,53,109 and Rs.2,73,635 respectively in these farms.

Production function analysis

Cobb Douglas production function was run using yield per hectare as the dependent variable and quantity of rhizome for planting material(kg), labour (man days), quantity of organic manure (kg), quantity of inorganic manure(kg), irrigation(numbers), and cost of plant protection (Rs.) as independent variables.

Results showed that 76 per cent of the variation in the dependent variable was explained by the independent variables selected for the study.

The variables labour and irrigation were significant at one per cent level of probability. The variables quantity of rhizome, quantity of organic manure and quantity of inorganic fertilizer were significant at five per cent level of probability.

MVP/MIC ratio was found to be greater than one for inputs of rhizome, labour, quantity of organic manure and quantity of inorganic fertilizer which indicate the under-utilization of these inputs.

Marketing of turmeric

Four types of market channels were identified for turmeric in the study area and price spreads were estimated for each of the four marketing channels so as to understand the comparative efficiency in turmeric marketing through different channels of marketing.

The price spread was Rs. 5335, Rs. 2335, Rs. 5085 and Rs. 1585 for four different market channels respectively. It was lower in the fourth marketing channel. The share received by the farmer constituted 40.7, 61.1, 43.5 and 71.2 per cent of consumer's rupee for four different market channels respectively.

The profit margin for wholesaler constituted 35.5 per cent of consumer's rupee in all two different market channels and the marketing cost bore by the wholesaler constituted 11.11 per cent of consumer's rupee in all two different market channels.

The profit margin for retailer constituted 7.7, 20.0, 7.7 and 12.7 per cent of consumer's rupee for four different market channels respectively and the marketing cost bore by the retailer constituted 1.11, 13.3, 1.11 and 14.54 per cent of consumer's rupee for four different market channels respectively.

Marketing Efficiency

Marketing efficiency of the different marketing channels was estimated using the following three methods:

1. Shepherd method
2. Acharya's approach
3. Calkin's index

The results of marketing efficiency calculated through Shepherd's approach and Acharya's approach revealed that the marketing efficiency was relatively higher in marketing channel IV in both the approaches, i.e. 6.21 in Shepherd's method and 4.98 in Acharya's approach.

The Calkin's index is low for the marketing channel IV. We know that the lower the value of the index, higher would be the efficiency. Thus the results revealed that the marketing channel IV in which the intermediaries were low had the highest efficiency.

Problems faced in turmeric cultivation and marketing by sample farmers

The producers expressed that the high labour cost was the most important problem (70.67) followed by low price (61.23). The next important reason was water scarcity (51.25) followed by cost of fertilizers and plant protection chemicals (45.75). The fifth problem felt by the producer was pest and disease attack (40.89). The farmers expressed price fluctuation was the most important problem followed by storage cost, low price. The results would indicate the need for development and promotion of storage facilities that would indirectly help to stabilize the prices.

Problems Faced by Intermediaries

The producers expressed that the lack of quality was the most important problem (64.56) followed by poor storage facility (61.23). The next important reason was high handling cost (39.15).

Conclusions

Important conclusions of the study are summarized below:

- It was found that the cost of production was higher in the case of marginal farmers followed by small and large farmers respectively which reflected the economies of scale.
- Production function analysis results indicated that an increase in quantity of rhizome, labour, quantity of organic manure, irrigation and quantity of inorganic fertilizer would attribute towards an increase in yield.
- It was also found that quantity of rhizome, labour, quantity of organic manure and quantity of inorganic fertilizers were under-utilized.
- Farmers were marketing their produce through regulated market reducing the influence of intermediaries. Marketing of the turmeric through the regulated market was found to be efficient with the help of Calkin's index, Shepherd's method and Acharya approach.
- High labour cost, low price, water scarcity, price fluctuation, storage cost, low price were some of the production and marketing constraints faced by the sample farmers.
- The lack of quality of turmeric and poor storage facility were the most important problems faced by the intermediaries.

Policy implications

The findings of the study and the conclusions drawn have got certain specific implications for the policy issues.

- The results of the study on economics of production showed that the net returns per hectare received from turmeric were relatively high for all the three

category of farmers. So, the agricultural extension system should take appropriate steps to promote scientific methods of turmeric cultivation.

- The results of production function analysis suggested that an increase in quantity of planting material, labour, quantity of organic manure and quantity of inorganic fertilizer would increase the yield of turmeric. Hence, the agriculture departments of the state government and the development agencies have to arrange for training programmes to make the farmers aware of appropriate use of inputs.
- The main problem faced by turmeric producers is price fluctuation. It was observed Rs.4000 per quintal to Rs. 15000 per quintal in the study area. Higher price fluctuation was the major constraint in the turmeric marketing. Hence establishing contract farming between turmeric growers and turmeric processing units will reduce price fluctuation and provide remunerative price to the turmeric growers during peak season.
- The farmers felt that high labour cost was the most important problem in cultivation of turmeric. Hence, research on developing labour-saving machineries should be given top priority to reduce cost of cultivation of turmeric.
- The marketing intermediaries felt that usage of chemicals for storage reduce the quality of turmeric and also it is the main hindrance for export. Hence, the research should focus on development of new varieties which have long storage life.



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